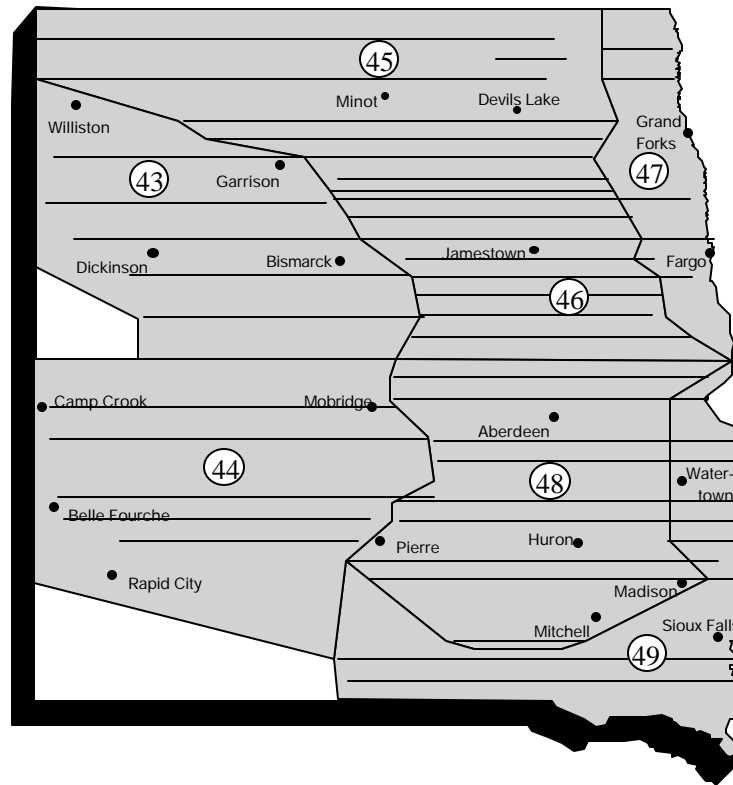


2000

WATERFOWL PRODUCTION SURVEY

FOR

SOUTH DAKOTA AND NORTH DAKOTA



TITLE: Waterfowl Production and Habitat Survey for South and North Dakota

STRATA SURVEYED: 44, 48, 49 (South Dakota)
43, 45, 46, 47 (North Dakota)

DATES: 1 - 17 July 2000

DATA SUPPLIED BY: United States Fish and Wildlife Service

Strata 45, 46, 47, 48, 49

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Strata 43 and 44

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ABSTRACT: The 2000 Waterfowl Production and Habitat Survey for South and North Dakota (east of the Missouri River) was conducted during 1 - 17 July. Survey procedures in 2000 were unchanged but traditional coverage was incomplete. Weather patterns in June and July offered little assistance to habitat in the southern two-thirds of South Dakota. In northern South Dakota and in much of North Dakota, post May survey precipitation maintained or improved habitat conditions for nesting and brooding. Wetland counts decreased in both states compared to July of 1999 (SD -53%, ND -42%) but remain significantly above long-term averages (SD 24%, ND 86%). The Duck Brood Index (DBI) in South Dakota (115.4) ranks fourth highest of record and in North Dakota another record brood index (217.6) was established. The 2000 DBI's easily surpass ten-year (SD 52%, ND 120%) and long-term (SD 166%, ND 290%) averages. The Late Nesting Index (LNI) decreased (-47%) in South Dakota compared to last year but increased in North Dakota (25%). The LNI for both states was below the ten-year (SD -70%, ND -33%) and the long-term (SD -53%, ND -44%) average.

METHODS: The procedures followed in conducting the 2000 waterfowl production survey are described in the Standard Operating Procedures (SOP) for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America, Section IV, revised 1987. No changes occurred this year in operational procedures but survey coverage was incomplete. Due to a tape recorder malfunction, observations from five segments in stratum 45 were incomplete or missing. A similar problem occurred in stratum 44 when one of the onboard computers disconnected from the port replicator during sampling of two segments. To rectify the problem, these seven segments of information (5 from 45 and 2 from 44) were removed from the appropriate stratum data sets. Stratum

indices in strata 44 and 45 were derived by using expansion factors adjusted for the missing segments (Tables 4 and 8). In the crew area, 2000 marked the first waterfowl production survey for the right seat observer. Margaret had assisted in conducting the Waterfowl Breeding Population survey earlier in the year. All survey data collected in 2000 are considered comparable. Transects in the Western Dakotas (strata 43 and 44) were completed by the Montana survey crew led by James Voelzer. Our appreciation is extended to the Montana crew for their help. Transect flying began in eastern South Dakota on 1 July and was completed in North Dakota on 17 July. Two days of survey flying were lost to inclement weather (wind/fog/rain/thunderstorms). All survey flights were completed in N-761, a wheeled Cessna 185, and required 65 hours of flight time.

WEATHER AND HABITAT CONDITIONS: June began in South Dakota with average highs reaching only the low to mid 80's. Early in the month, all weather reporting stations had some precipitation. The highest totals in the crew area were reported from Eureka (1.56") and Aberdeen (2.20"). The week ending 6/11 provided hot, windy conditions and temperatures over 100° were common. The hot weather did promote crop and cover development, but rain was a rare occurrence. These conditions rapidly depleted soil moisture levels. During this warm week, significant cutting (1st) of alfalfa began. Another "cool down" occurred mid-month (temperatures 2° - 9° below normal) and most east river locations received .5" to 1" of precipitation. By months end, normal temperatures had returned and scattered precipitation was common. Aberdeen reported 2.98" (highest this week for the state) but most areas received .5" or less. Possible benefits from late June showers were off-set by high winds which continued to deplete soil moisture levels.

In North Dakota, temperatures at the start of June were running 5° - 10° below normal with light showers delivering amounts of about an inch or more to only east central and south east regions. The north eastern part of the state remained quite dry. During the first full week of the month (ending 6/11) a dramatic warming trend occurred and many daytime temperatures were 20° above normal. The warmest conditions occurred in the already parched north eastern part of the state. Late in this period, some areas in the central and north central region did receive .75" to 1.5" of rain. During the week ending 6/18, a significant weather system moved in. Temperatures returned to cooler than normal and remained so for the rest of the month. Associated with this system, rains of 2" - 12" (some reports of 15" - 20" west of Grand Forks) were deposited on much of the eastern two-thirds of the state. Although some localized flooding was reported along the Turtle, Park, and Forest rivers, these areas are of relatively low value to nesting waterfowl and any nest loss that may have occurred is considered insignificant. Generally, the precipitation was welcome in terms of improving habitat conditions but it would have been more beneficial had it been delivered over a 5 to 10 day period.

During the first 9 or 10 days of July, temperatures and humidity levels were above normal in both states. A high level, high pressure system along with the position of the jet stream caused a stationary front to situate from south to north in western South Dakota. At the North Dakota border, the front turned east, running into Minnesota. For nearly 10 days, waterfowl survey crews dealt with early morning fog and high temperatures and humidity. These conditions were quickly replaced (mid-morning) by increasing winds and rapidly developing thunderstorms. The low level "lows" and the associated thunderstorms, tracking along the stationary front, provided little benefit to southern areas of

the state. Most of the rain benefit was realized along the frontal zone paralleling the SD/ND border. Here the storms would roll along the front and deposit rain from the Missouri River to the eastern border of South Dakota. Once survey crews moved north of the frontal boundary and into North Dakota, temperatures moderated (afternoon highs in the 70° 's and 80° 's) with a more typical summer pattern of afternoon build-up of cumulus clouds followed by evening or night time thunderstorms. Night temperatures in both states during July were moderate (to warmer than normal) and conducive to brooding.

SOUTH DAKOTA (St. 48/49: 1 - 10 July)

Wetland counts statewide decreased -53% in South Dakota compared to 1999 (Table 3). The July index decreased -33% since the May survey and is -15% below the ten-year mean, but is 24% above the long-term average (LTA).

Stratum 44 - Upland and wetland basin emergent cover was reported to be in excellent condition. Only limited rainfall was received since the May survey. Although there was no change in the wetland index since the May survey, the 2000 July wetland count decreased -35% compared to last year. The 2000 wetland index is similar to (-5%) the ten-year average and 28% above the long-term mean.

Stratum 48 - Wetland counts in the stratum decreased typically (-44%) since May. The stratum index was -54% lower than July of 1999 and was below (-15%) the ten-year average, but remained 33% above the long-term comparison. Over much of the glacial drift plain south of Aberdeen, water levels in dugouts and Type IV and V wetlands were in limited recessional stages. Here Type I and III basins, which remained dry since May, had often been tilled and planted and overall habitat conditions were considered only fair. Northern portions of the drift plain (essentially the northern tier of counties) and in the Missouri and Prairie coteau areas provided more abundant water with less recession occurring in the basins. Basin and upland cover in this portion of 48 was in good to very good condition and overall habitat was classed as such.

Stratum 49 - Wetland conditions in the south central and south eastern portions of the stratum remained very dry since May and here, habitat conditions were considered poor. The lack of wetland improvement since May (-45%) helped decrease the index compared to 1999 (-69%) and the ten-year average (-28%). The 2000 figure was similar to (2%) the long-term average. Many Type IV basins and dugouts were vestigial stage or dry. As in stratum 48, the less permanent basins had been tilled and planted. With the exception of the Prairie Coteau, the remainder of the stratum was considered in fair condition with average water and adequate cover. In the Prairie Coteau portion of 49 existed the best combinations of water and cover. Here we judged overall habitat conditions as good.

NORTH DAKOTA (St. 45/46/47: 11 - 17 July)

Total wetland counts for North Dakota in July were unchanged (3%) since May 2000 (Table 7). Although the index decreased (-42%) since July 1999, the figure remains 29% above the ten-year mean and 86% above the long-term average.

Stratum 43 - Considerable rain received since the May survey held wetland losses for that period to only -5%. The wetland count in the stratum decreased compared to last year (-27%) and the ten-year average (-10%), but was 16% above the long-term figure. It was reported that cover conditions improved since May and overall habitat conditions in nearly all areas adjacent to strata 45 and 46 were considered good. Conditions in the central and south western region were deemed fair with the west central portion of stratum 43 rated as poor.

Stratum 45 - Forty-five was the only stratum in the crew area where wetland counts increased since the May survey (15%). The index of 416,800 wetlands fell short (-49%) of the 1999 figure but was well above the ten-year (47%) and long-term (105%) averages. Overall, July habitat conditions in Stratum 45 were good and exhibited the most noticeable improvements of any stratum since May. Only small areas of fair habitat occurred and were located in the north west, west central, north central, and north eastern regions. Beneficial June and July precipitation had improved conditions in existing wetlands and created some Type III water since the breeding population survey. Northern reaches of the Missouri Coteau were a bit drier than in recent years but the existing water was complimented by excellent stands of upland cover. Water in the coteau improved to the south. Emergent and margin cover in and around basins, generally, looked good to very good stratum wide.

Stratum 46 - In Stratum 46 the wetland index decreased -35% since 1999 but only -9% since May of 2000. This year's figure is 27% above the ten-year average and 111% above the long-term average. Upland and wetland associated cover were lush and overall habitat conditions throughout the stratum were very good. As usual though, the "best of the best" habitat occurred in the Missouri Coteau. Precipitation received since our May counts maintained stability of the habitat in the stratum, which as in May, was overall the best in the crew area.

Stratum 47 - A decrease of -16% in wetland counts since May and -27% since July 1999 occurred in stratum 47. The index was 10% and 48% above the respective ten-year and long-term averages. Wetland improvements were realized in the central and northern portions of the stratum. Resulting from heavy June rains, wetland and habitat conditions are now considered good in the southern two thirds of the stratum while only the northern third was classed as fair/poor. Even though habitat conditions are good in much of the stratum, production, as always, is severely limited by the low number of remaining basins, limited cover, and high nest predation.

Production Indices: Perfect correlation between waterfowl breeding population and waterfowl production survey results seldom occur. It is logical though that trends should agree. In May of 2000, South Dakota held its second highest waterfowl breeding population of record and North Dakota established a new record (see May 2000 report). Production indices from the Dakotas do not match exactly, but the trends are remarkably close.

The DBI in South Dakota was fourth highest of record with 115,400 broods observed. The index decreased slightly (-11%) from the 1999 figure, is 52% above the ten-year average, and 166% above the long-term average (Table 2). Examination by stratum reveals significant decreases since last years

DBI's from Stratum 48 (-27%) and Stratum 49 (-31%). The decreases seem logical considering only poor or fair habitat conditions existing in about half of the combined (48 + 49) area. Strong production in Stratum 44 (DBI +35% since 1999) greatly assisted in making 2000 another very good year in South Dakota (see 1999 report). The average brood size in South Dakota decreased slightly since last year (-9%) but was similar to the ten-year average (-5%) and the long-term average (4%). Coot production appears to have responded to the decreased wetland index by posting brood index decreases of -74% and -47% compared to last year and the ten-year average. The 2000 coot brood index remained 15% above the long-term average.

In North Dakota, observed broods (217.6) increased 15% since 1999 and establishes a new record (Table 6). The 2000 DBI exceeds the ten-year and long-term comparisons by 120% and 290% respectively. Comparing 2000 production figures by stratum to those from 1999 suggests little change in production from stratum 43 (-6%) or 45 (1%). Although the brood index in Stratum 47 decreased -45%, the sample size is small and the difference equates to only 1700 broods. The brood index in Stratum 46 increased an impressive 43% compared to 2000 (see 1999 report). Habitat conditions in 46 were best in the crew area in May and July, so the strong increase is not surprising. Average brood size in North Dakota decreased (-20%) since last year and was similar to the ten-year (-9%) and long-term (-2%) averages. The coot brood index decreased (-19%) compared to last year but is above the ten-year mean (66%) and the LTA (299%).

As always, we believe our DBI's are conservative. With an inexperienced, first year observer in the right seat of the aircraft and both observers dealing with thick cover and reduced visibility, many broods were certainly missed. The proportion of observed/actual broods will remain unknown until ground crews are utilized in conducting the July survey. During the dry years of 1990 and 1991, 30 broods recorded by our crew during an average day of surveying (16-18 segments) was a "good" day. This year our highest one day counts were 201 broods in South Dakota and 410 broods in North Dakota.

Even though the DBI rankings (SD fourth highest of record, ND highest of record) do not track exactly with 2000 breeding population indices, the trends are similar. Once again, a large waterfowl breeding population appears to have had a strong and successful nesting effort.

Late Nesting Indices: The Late Nesting Index is intended as a relative measure of late or secondary nesting effort (Tables 1 and 5). South Dakota total LNI decreased -47% since last year and remains below both the 10-year (-70%) and long-term (-53%) averages. It is probable that the relatively drier conditions in much of South Dakota are doing little to encourage late nesting. In North Dakota, total LNI increased 25% compared to last year, yet remained below 10-year (-33%) and long-term (-44%) figures. In North Dakota, June precipitation maintained or improved the generally good conditions present in May and it appears that a successful first nesting effort has occurred.. With the good to very good quality habitat present in the crew area from about Aberdeen, SD north, any late nesting effort in this region should do well.

Conclusions:

1. July wetland counts decreased in both states (SD -53%, ND -42%) compared to 1999. Although both states were wetter than long-term averages (SD 24%, ND 86%) only North Dakota was wetter than the ten-year mean (SD -15%, ND 29%). General habitat conditions in the crew area are very good to good from the northern tier of counties in South Dakota north to the Canada border. South of this area in South Dakota, conditions are generally fair with the exception of south central and south eastern Stratum 49 which is poor. Another small area of poor habitat exists in the northern Red River Valley in Stratum 47. A few scattered areas of fair habitat are present east of the poor area in 47, and in north central and along the north western border of Stratum 45. Rains deposited since the May survey offered little benefit to the southern two-thirds of South Dakota. Precipitation during the May/July survey interim period was beneficial in maintaining or improving habitat in extreme northern South Dakota and throughout most of North Dakota. These habitat conditions should persist through fledgling stages.
2. The DBI in South Dakota decreased -11% since 1999 and is fourth highest of record. The figure (115.4) is 52% above the ten-year and 166% above the long-term average. In North Dakota, the 2000 DBI (217,600) is 15% above the 1999 level and establishes a new record high. The index exceeds the ten-year (120%) average and the LTA (290%). Average brood sizes decreased in both states compared to last year (SD -9%, ND -20%), decreased slightly from the ten-year averages (SD -5%, ND -9%) and were similar to long-term averages (SD 4%, ND -2%). Statewide waterfowl production in North and South Dakota is above average this year.
3. The total LNI decreased -47% compared to last year in South Dakota but increased 25% in North Dakota. The LNI remains below 10-year and long-term averages in both states. It is our opinion that because of the relatively depressed habitat conditions in the southern two thirds of South Dakota, little late nesting will be attempted. North of Aberdeen, SD and generally throughout east river North Dakota, first nesting appears to have been quite successful. In this region, late nesting that is attempted should do well based on the quality and stability of existing habitat.

John W. Solberg
July 2000

Table 1. Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2000 (index in thousands).^a

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Broods										
Duck brood index	130.2	115.4								
Average brood size ^b	5.8	5.3								
Coot brood index	20.7	5.4								
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	13.6	6.0								
Am. black duck	0.0	0.0								
Gadwall	6.9	2.1								
Am. wigeon	1.5	1.1								
Green-winged teal	0.0	0.0								
Blue-winged teal	4.8	1.0								
N. shoveler	0.3	1.1								
N. pintail	<u>0.5</u>	<u>2.2</u>								
Subtotal	27.6	13.5								
Divers										
Redhead	1.1	0.2								
Canvasback	0.0	0.0								
Scaups	0.2	0.8								
Ring-necked duck	0.0	0.0								
Goldeneyes	0.0	0.0								
Bufflehead	0.0	0.0								
Ruddy duck	<u>0.9</u>	<u>0.9</u>								
Subtotal	2.2	1.9								
Miscellaneous										
Oldsquaw	0.0	0.0								
Eiders	0.0	0.0								
Scoters	0.0	0.0								
Mergansers	<u>0.0</u>	<u>0.3</u>								
Subtotal	0.0	0.3								
Total ducks	29.8	15.7								

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2000 (index in thousands).^a

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Broods										
Duck brood index	25.7	18.9	27.5	14.3	36.4	110.9	68.5	114.4	118.8	119.5
Average brood size ^b	4.9	4.3	4.4	5.8	5.9	6.2	6.2	5.4	5.9	5.9
Coot brood index	2.6	1.9	1.5	5.0	4.7	15.6	12.9	15.3	12.6	10.6
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	11.1	38.0	30.2	21.7	25.4	5.2	30.8	17.9	8.0	7.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	6.6	23.7	16.8	11.3	17.4	4.3	24.1	9.5	4.9	4.7
Am. wigeon	1.8	3.0	2.7	1.8	2.2	1.5	4.8	3.5	1.5	3.0
Green-winged teal	0.0	0.3	0.0	0.3	0.2	0.0	0.7	0.5	0.0	0.0
Blue-winged teal	3.8	21.5	17.4	15.8	10.7	1.8	14.5	3.7	2.5	2.6
N. shoveler	0.4	2.2	2.4	1.5	3.5	0.3	0.8	1.0	0.5	1.0
N. pintail	<u>4.5</u>	<u>1.9</u>	<u>6.2</u>	<u>1.3</u>	<u>4.4</u>	<u>1.8</u>	<u>4.9</u>	<u>2.5</u>	<u>1.0</u>	<u>1.8</u>
Subtotal	28.3	90.5	75.7	53.7	63.8	14.9	80.6	38.6	18.4	20.7
Divers										
Redhead	1.6	1.1	1.6	2.0	5.5	0.3	3.5	0.0	0.6	0.2
Canvasback	0.2	0.5	0.3	0.3	0.0	0.0	0.8	0.0	0.0	0.0
Scaups	0.2	0.2	0.2	0.3	1.6	0.0	1.2	0.2	0.5	0.2
Ring-necked duck	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>1.6</u>	<u>2.8</u>	<u>1.6</u>	<u>3.1</u>	<u>2.4</u>	<u>1.1</u>	<u>1.7</u>	<u>0.8</u>	<u>0.5</u>	<u>0.7</u>
Subtotal	3.5	5.0	3.7	5.7	9.5	1.4	7.5	1.2	1.6	1.1
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.3</u>	<u>0.2</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	32.0	95.7	79.4	59.4	73.3	16.3	88.1	39.8	20.0	21.8

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2000 (index in thousands).^a

Species	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Broods										
Duck brood index	28.7	16.3	6.5	41.4	41.3	58.6	23.4	65.0	56.8	20.8
Average brood size ^b	5.0	4.6	4.7	4.6	4.5	4.3	4.2	4.5	5.0	4.3
Coot brood index	1.2	3.3	0.8	3.5	5.2	8.6	2.7	8.3	8.0	1.1
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	6.7	3.9	4.5	10.7	14.4	21.6	8.8	13.4	6.3	4.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	2.0	1.0	2.5	5.1	12.6	14.1	2.8	6.8	3.5	2.5
Am. wigeon	1.6	0.2	1.2	2.1	2.2	5.4	2.7	1.9	1.9	0.3
Green-winged teal	0.3	0.5	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.5
Blue-winged teal	0.7	1.2	1.7	5.1	8.9	19.8	2.6	8.7	3.5	2.9
N. shoveler	0.3	0.3	0.2	1.1	0.7	4.9	0.2	1.6	1.2	1.4
N. pintail	<u>0.7</u>	<u>0.5</u>	<u>2.0</u>	<u>4.0</u>	<u>4.2</u>	<u>10.2</u>	<u>1.2</u>	<u>5.0</u>	<u>2.3</u>	<u>1.5</u>
Subtotal	12.2	7.6	11.9	28.0	42.9	76.1	18.4	38.0	19.2	13.6
Divers										
Redhead	0.0	0.0	0.5	2.4	2.1	3.6	1.0	1.0	1.1	0.0
Canvasback	0.0	0.0	0.2	0.3	0.0	0.2	0.0	0.2	0.3	0.2
Scaups	0.0	0.0	0.0	0.3	0.8	0.0	0.2	0.3	0.7	0.0
Ring-necked duck	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>0.8</u>	<u>1.5</u>	<u>1.6</u>	<u>1.5</u>	<u>2.0</u>	<u>2.8</u>	<u>0.8</u>	<u>2.4</u>	<u>1.6</u>	<u>0.4</u>
Subtotal	0.8	1.5	2.3	4.6	5.1	6.6	1.9	3.8	3.7	0.6
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	13.0	9.1	14.2	32.7	48.0	82.8	20.3	41.8	22.9	14.2

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2000 (index in thousands).^a

Species	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Broods										
Duck brood index	41.5	38.7	26.3	58.8	42.3	18.8	21.1	10.9	20.7	45.3
Average brood size ^b	5.5	5.7	5.5	5.4	4.4	4.8	5.0	4.8	4.7	5.0
Coot brood index	4.7	3.3	1.0	6.6	1.8	0.3	0.0	0.3	0.3	0.9
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	12.6	11.9	5.9	13.8	11.0	9.1	12.3	5.2	4.7	8.5
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	9.0	4.6	3.8	8.1	3.4	8.2	8.0	2.4	1.8	6.3
Am. wigeon	1.3	2.4	0.0	2.5	2.3	1.0	1.5	1.2	2.2	2.3
Green-winged teal	0.9	2.1	0.0	0.0	0.0	0.7	0.2	0.0	0.0	0.6
Blue-winged teal	6.8	3.3	3.7	7.6	4.1	5.0	7.5	0.6	2.8	4.1
N. shoveler	1.1	1.6	0.0	0.3	1.2	0.0	0.0	0.0	0.4	0.8
N. pintail	<u>2.4</u>	<u>2.0</u>	<u>1.0</u>	<u>2.8</u>	<u>4.3</u>	<u>1.7</u>	<u>1.5</u>	<u>2.5</u>	<u>1.1</u>	<u>3.4</u>
Subtotal	34.1	27.9	14.4	35.0	26.3	25.7	31.0	11.9	13.0	26.1
Divers										
Redhead	1.0	0.8	0.0	0.8	0.0	0.2	0.5	0.0	0.0	2.9
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.5
Scaups	0.0	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.4
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>1.4</u>	<u>2.2</u>	<u>0.9</u>	<u>3.4</u>	<u>2.0</u>	<u>1.3</u>	<u>2.7</u>	<u>0.0</u>	<u>0.2</u>	<u>1.8</u>
Subtotal	2.4	3.9	0.9	4.2	2.5	1.5	3.1	0.3	0.4	5.5
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.7</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.4	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	36.5	32.2	15.3	40.9	28.8	27.2	34.1	12.2	13.4	31.6

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 1 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in South Dakota, 1959-2000 (index in thousands).^a

Species	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Broods										
Duck brood index	11.2	33.5	41.2	42.2	62.8	11.6	18.8	45.1	22.7	23.3
Average brood size ^b	4.4	5.2	5.2	5.1	5.0	6.4	4.5	7.2	4.6	4.9
Coot brood index	0.3	0.6	2.2	2.7	1.0	1.1	0.4	15.2	2.6	2.4
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	6.6	11.1	7.4	14.0	3.5	6.1	19.1	8.4	14.3	6.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	0.0	1.4	0.1	5.9	3.3	2.5	7.2	6.0	7.3	2.6
Am. wigeon	0.0	0.1	0.3	0.3	0.0	0.0	0.0	0.0	2.3	1.3
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Blue-winged teal	1.3	2.6	4.5	21.7	2.2	7.6	9.2	1.0	6.2	1.0
N. shoveler	0.0	0.0	0.0	0.9	0.0	0.4	0.0	2.2	0.8	0.3
N. pintail	<u>0.3</u>	<u>2.4</u>	<u>1.9</u>	<u>4.5</u>	<u>0.9</u>	<u>0.0</u>	<u>0.0</u>	<u>0.6</u>	<u>0.5</u>	<u>0.0</u>
Subtotal	8.2	17.6	14.1	47.3	9.9	16.7	35.5	18.1	31.6	11.8
Divers										
Redhead	0.0	0.3	0.1	1.7	0.3	0.6	3.0	0.0	0.2	0.0
Canvasback	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.0
Scaups	0.0	0.4	0.5	0.9	0.0	0.0	0.0	0.1	0.3	0.0
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>0.0</u>	<u>1.1</u>	<u>4.7</u>	<u>1.9</u>	<u>2.4</u>	<u>0.4</u>	<u>6.0</u>	<u>4.7</u>	<u>1.6</u>	<u>0.8</u>
Subtotal	0.0	1.8	5.3	4.5	2.7	1.1	9.0	4.9	2.7	0.8
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	8.2	19.5	19.4	51.8	12.6	17.8	44.4	22.9	34.4	12.5

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 2. Status of waterfowl brood and late-nesting indices by stratum in South Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, and the 1959-1999 long-term mean (index in thousands).^a

Species	Strata (2000)			2000 Total	1999 Total	10-year Mean	Long-term Mean	Percent change from		
	44	48	49					1999	10-year Mean	Long-term Mean
Broods										
Duck brood index	45.8	58.5	11.1	115.4	130.2	75.9	43.4	-11%	52%	166%
Average brood size ^b	4.7	5.6	5.5	5.3	5.8	5.6	5.1	-9%	-5%	4%
Coot brood index	0.3	4.7	0.4	5.4	20.7	10.1	4.7	-74%	-47%	15%
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	3.4	2.0	0.6	6.0	13.6	19.8	12.1	-56%	-70%	-50%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Gadwall	1.1	0.8	0.2	2.1	6.9	12.4	6.7	-70%	-83%	-69%
Am. wigeon	1.1	0.0	0.0	1.1	1.5	2.6	1.7	-27%	-58%	-35%
Green-winged teal	0.0	0.0	0.0	0.0	0.0	0.2	0.2	NC	-	-
Blue-winged teal	0.0	0.8	0.2	1.0	4.8	9.5	6.3	-79%	-89%	-84%
N. shoveler	1.1	0.0	0.0	1.1	0.3	1.4	0.9	267%	-21%	22%
N. pintail	2.0	0.2	0.0	2.2	0.5	2.6	2.3	340%	-15%	-4%
Subtotal	8.7	3.8	1.0	13.5	27.6	48.5	30.2	-51%	-72%	-55%
Divers										
Redhead	0.0	0.2	0.0	0.2	1.1	1.6	1.0	-82%	-88%	-80%
Canvasback	0.0	0.0	0.0	0.0	0.0	0.2	0.1	NC	-	-
Scaups	0.8	0.0	0.0	0.8	0.2	0.5	0.3	300%	60%	167%
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.1	0.0	NC	-	NC
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Ruddy duck	0.0	0.5	0.4	0.9	0.9	1.6	1.8	NC	-44%	-50%
Subtotal	0.8	0.7	0.4	1.9	2.2	3.9	3.2	-14%	-51%	-41%
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Mergansers	0.3	0.0	0.0	0.3	0.0	0.0	0.1	NC	+	200%
Subtotal	0.3	0.0	0.0	0.3	0.0	0.0	0.1	NC	+	200%
Total ducks	9.8	4.5	1.4	15.7	29.8	52.4	33.4	-47%	-70%	-53%

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 3. Long-term trend in July pond indices by stratum in South Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, the 1970-1999 long-term mean, and comparison of May with July ponds in 2000 (estimates in thousands).^a

Year	Strata			Total
	44	48	49	
1970	77.6	98.3	52.6	228.5
1971	115.1	117.7	70.5	303.3
1972	145.6	129.0	59.4	334.0
1973	119.3	76.0	54.8	250.2
1974	62.7	61.0	38.1	161.9
1975	105.4	80.7	39.4	225.5
1976	95.3	64.0	43.5	202.8
1977	93.8	43.2	25.5	162.6
1978	99.3	100.5	43.9	243.8
1979	114.6	61.4	37.4	213.3
1980	52.3	33.3	18.1	103.7
1981	75.8	37.5	31.7	145.0
1982	122.3	88.2	55.7	266.3
1983	74.6	134.3	125.9	334.7
1984	102.9	341.7	184.8	629.4
1985	120.1	93.2	71.8	285.1
1986	139.0	175.8	99.1	413.9
1987	133.7	102.1	60.2	296.0
1988	92.0	59.3	46.5	197.8
1989	119.6	74.2	46.3	240.0
1990	117.5	81.2	52.6	251.3
1991	113.2	130.8	64.4	308.4
1992	93.8	128.8	72.0	294.6
1993	406.4 ^b	224.3	129.4	760.1
1994	143.8	194.7	94.1	432.6
1995	186.0	252.0	105.0	543.0
1996	112.5	223.9	100.2	436.6
1997	109.2	263.4	114.2	486.8
1998	170.4	248.5	110.0	528.9
1999	246.4	394.6	250.7	891.7

Table 3 (cont).

Long-term trend in July pond indices by stratum in South Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, the 1970-1999 long-term mean, and comparison of May with July ponds in 2000 (estimates in thousands).^a

Year	Strata			Total
	44	48	49	
2000	160.7	182.5	78.5	421.7
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
10-year mean	169.9	214.2	109.3	493.4
Long-term mean	125.3	137.1	76.6	339.1
<u>Percent Change</u>				
2000 from 1999	-35%	-54%	-69%	-53%
2000 from 10-year mean	-5%	-15%	-28%	-15%
2000 from long-term mean	28%	33%	2%	24%
May ponds 2000 (adjusted)	161.3	324.7	141.6	627.6
<u>Percent change</u>				
May to July 2000	-	-44%	-45%	-33%
(adjusted) (unadjusted)				

^aJuly ponds unadjusted for visibility bias.

^bDue to an abnormally high visibility rate in May, 1993 July ponds for stratum 44 were calculated by applying % change from May to July raw data, to adjusted May ponds.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 4. Survey design for South Dakota, July 2000.

	Stratum			Total
	44	48	49	
<hr/>				
<u>Survey design</u>				
Square miles in stratum	28,930	24,587	15,830	67,716
Square miles in sample - water	216	315	171	702
Square miles in sample - ducks	108	157.5	85.5	351.0
Linear miles in sample	864	1,260	684	2,808
Number of transects in sample	5	9	11	25
Number of segments in sample	48	70	38	156
Expansion factor - water	133.9370	78.0539	92.5731	-
Expansion factor - ducks	267.8740	156.1079	185.1462	-
<u>Current year coverage</u>				
Square miles in sample - water	207	315	171	702
Square miles in sample - ducks	103.5	157.5	85.5	351.0
Linear miles in sample	828	1,260	684	2,808
Number of transects in sample	5	9	11	25
Number of segments in sample	46	70	38	156
Expansion factor - water	139.7600	78.0539	92.5731	-
Expansion factor - ducks	279.5210	156.1079	185.1462	-

Table 5. Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2000 (index in thousands).^a

Species	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<hr/>										
Broods										
Duck brood index	196.7	189.4	217.6							
Average brood size ^b	6.2	6.6	5.3							
Coot brood index	78.6	82.5	66.7							
Late-nesting index ^c										
Ducks										
Dabblers										
Mallard	3.3	5.1	3.9							
Am. black duck	0.0	0.0	0.0							
Gadwall	3.1	1.5	2.6							
Am. wigeon	0.9	0.5	0.0							
Green-winged teal	0.0	0.0	0.1							
Blue-winged teal	2.4	1.1	2.6							
N. shoveler	0.8	0.2	0.5							
N. pintail	<u>0.0</u>	<u>0.5</u>	<u>1.0</u>							
Subtotal	10.5	8.9	10.7							
Divers										
Redhead	0.7	0.4	0.5							
Canvasback	0.0	0.0	0.0							
Scaups	0.1	0.0	0.9							
Ring-necked duck	0.1	0.0	0.0							
Goldeneyes	0.0	0.0	0.0							
Bufflehead	0.0	0.0	0.0							
Ruddy duck	<u>4.7</u>	<u>2.6</u>	<u>2.8</u>							
Subtotal	5.6	3.0	4.2							
Miscellaneous										
Oldsquaw	0.0	0.0	0.0							
Eiders	0.0	0.0	0.0							
Scoters	0.0	0.0	0.0							
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>							
Subtotal	0.0	0.0	0.0							
Total ducks	16.1	11.9	14.9							

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2000 (index in thousands).^a

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Broods										
Duck brood index	46.9	40.9	14.3	23.5	17.5	29.3	85.3	107.3	155.9	171.1
Average brood size ^b	4.8	4.8	4.5	5.3	5.7	6.1	5.7	6.1	6.0	5.7
Coot brood index	5.7	3.7	1.3	1.1	4.3	5.1	25.2	52.8	62.9	87.7
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	3.8	11.7	11.8	9.0	7.8	10.7	3.1	5.5	7.5	2.3
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	3.1	3.4	5.7	3.4	3.6	13.0	0.9	6.5	7.1	2.6
Am. wigeon	1.0	1.5	0.7	0.9	1.3	1.5	0.9	0.7	1.4	0.4
Green-winged teal	0.1	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.1	0.2
Blue-winged teal	2.8	3.3	6.2	5.0	4.0	4.1	0.5	4.5	2.4	2.3
N. shoveler	0.5	0.3	0.6	0.8	0.1	0.4	0.0	0.0	0.0	0.7
N. pintail	<u>2.2</u>	<u>3.9</u>	<u>0.8</u>	<u>1.5</u>	<u>1.1</u>	<u>0.8</u>	<u>0.7</u>	<u>0.3</u>	<u>1.7</u>	<u>0.0</u>
Subtotal	13.5	24.1	25.9	20.7	18.1	30.6	6.3	17.6	20.2	8.5
Divers										
Redhead	0.8	1.2	1.3	0.4	1.4	4.0	0.9	1.8	1.0	0.7
Canvasback	0.0	0.8	1.2	0.3	0.0	0.3	0.0	0.1	0.0	0.0
Scaups	0.3	0.3	0.5	0.0	0.2	0.0	0.2	0.1	0.3	0.0
Ring-necked duck	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Ruddy duck	<u>0.7</u>	<u>3.0</u>	<u>1.0</u>	<u>1.6</u>	<u>3.5</u>	<u>4.8</u>	<u>2.9</u>	<u>7.8</u>	<u>9.6</u>	<u>1.2</u>
Subtotal	1.8	5.5	4.1	2.4	5.1	9.3	4.2	9.8	10.9	2.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.2</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total ducks	15.2	29.6	29.9	23.1	23.2	40.1	10.5	27.4	31.1	10.5

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2000 (index in thousands).^a

Species	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Broods										
Duck brood index	37.6	30.7	37.8	25.5	72.7	52.2	84.3	46.6	62.0	91.9
Average brood size ^b	5.5	5.1	4.8	4.8	5.0	4.7	4.3	4.6	4.5	4.8
Coot brood index	1.2	3.4	3.6	3.5	30.6	12.1	11.9	11.9	14.4	28.8
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	5.2	2.7	2.3	3.8	13.1	9.3	13.9	5.3	4.8	4.7
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	1.9	2.0	0.3	1.6	6.7	14.2	10.4	2.7	1.3	4.2
Am. wigeon	0.5	0.4	0.1	1.0	3.0	2.1	1.5	1.2	1.1	0.9
Green-winged teal	0.0	0.0	0.2	0.2	0.2	0.9	0.1	0.1	0.3	0.3
Blue-winged teal	1.4	1.0	0.0	1.2	7.1	8.2	6.2	2.3	2.7	4.1
N. shoveler	0.0	0.5	0.0	0.2	1.7	1.0	1.1	0.7	0.6	1.1
N. pintail	<u>3.5</u>	<u>1.9</u>	<u>0.2</u>	<u>1.1</u>	<u>1.6</u>	<u>6.3</u>	<u>2.8</u>	<u>1.5</u>	<u>1.2</u>	<u>3.0</u>
Subtotal	12.5	8.4	3.1	9.1	33.4	42.0	36.0	13.8	12.0	18.2
Divers										
Redhead	2.7	0.7	0.0	0.0	3.4	2.4	1.6	0.9	0.3	2.3
Canvasback	0.4	0.1	0.2	0.3	0.7	0.2	1.0	0.1	0.2	0.2
Scaups	0.3	0.3	0.0	0.0	0.9	3.5	4.3	1.1	0.4	1.8
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>2.3</u>	<u>1.3</u>	<u>0.7</u>	<u>1.2</u>	<u>13.2</u>	<u>9.6</u>	<u>9.0</u>	<u>3.2</u>	<u>2.5</u>	<u>4.5</u>
Subtotal	5.8	2.4	0.8	1.5	18.2	16.2	16.1	5.3	3.4	8.8
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	18.3	10.8	3.9	10.6	51.5	58.1	52.1	19.2	15.4	27.0

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2000 (index in thousands).^a

Species	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Broods										
Duck brood index	27.3	50.0	57.6	39.0	51.9	36.9	34.1	41.1	28.3	29.9
Average brood size ^b	5.5	6.2	6.5	5.6	5.5	5.2	5.8	5.7	5.7	4.5
Coot brood index	5.2	14.2	19.5	15.0	16.0	8.1	12.6	6.4	5.4	1.2
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	7.9	9.4	9.7	9.0	9.6	7.7	8.5	33.1	8.6	3.6
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	4.9	9.6	5.9	6.3	10.7	2.0	15.1	31.4	3.2	2.0
Am. wigeon	0.6	0.9	0.0	0.3	1.0	1.6	0.4	1.1	0.6	0.4
Green-winged teal	0.0	1.0	2.6	0.5	0.2	0.2	0.3	0.0	0.4	0.2
Blue-winged teal	0.4	11.7	2.4	4.8	7.7	2.9	11.0	29.8	1.4	1.7
N. shoveler	0.0	0.7	0.1	0.0	0.2	0.0	0.0	0.8	1.0	0.0
N. pintail	<u>0.0</u>	<u>3.2</u>	<u>2.0</u>	<u>0.6</u>	<u>1.5</u>	<u>0.6</u>	<u>0.4</u>	<u>3.1</u>	<u>3.1</u>	<u>1.5</u>
Subtotal	13.8	36.6	22.7	21.5	30.8	15.0	35.7	99.3	18.3	9.3
Divers										
Redhead	0.2	1.4	1.6	0.1	0.7	0.5	0.6	3.4	0.3	0.3
Canvasback	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.2
Scaups	0.0	0.6	0.3	0.3	0.3	0.2	0.9	0.3	0.0	0.0
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>3.1</u>	<u>4.7</u>	<u>5.0</u>	<u>1.4</u>	<u>5.6</u>	<u>1.6</u>	<u>4.8</u>	<u>8.4</u>	<u>4.0</u>	<u>0.5</u>
Subtotal	3.3	6.7	7.0	1.9	6.7	2.9	6.2	12.3	4.4	1.0
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	17.1	43.3	29.8	23.3	37.5	17.9	41.9	111.6	22.7	10.3

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 5 (cont). Long-term trend in waterfowl brood and late-nesting indices by species in North Dakota, 1958-2000 (index in thousands).^a

Species	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Broods										
Duck brood index	68.7	13.5	42.5	26.7	24.3	31.6	15.6	15.9	41.6	49.5
Average brood size ^b	5.6	4.9	5.4	4.1	4.7	5.0	5.6	6.1	6.6	5.4
Coot brood index	13.3	1.3	4.8	1.1	1.4	1.4	3.1	4.0	21.7	14.9
Late-nesting index^c										
Ducks										
Dabblers										
Mallard	4.5	4.2	9.4	3.5	19.9	6.7	5.5	6.0	9.9	17.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	1.7	0.6	2.7	2.3	6.2	0.6	2.8	6.5	3.2	14.0
Am. wigeon	1.1	0.0	0.0	0.0	0.0	0.8	0.0	0.3	0.0	0.9
Green-winged teal	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.5
Blue-winged teal	2.1	0.6	4.0	1.5	13.9	3.8	5.5	3.6	3.3	10.5
N. shoveler	0.2	0.0	0.2	0.0	0.9	0.0	1.0	0.0	1.3	0.2
N. pintail	<u>0.0</u>	<u>1.1</u>	<u>0.6</u>	<u>2.1</u>	<u>4.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>1.2</u>	<u>1.6</u>
Subtotal	9.6	6.4	16.9	9.7	45.0	12.1	14.7	16.3	19.0	45.0
Divers										
Redhead	0.0	0.0	1.3	0.2	3.8	0.2	0.0	0.3	0.7	0.8
Canvasback	0.3	0.6	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Scaups	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ruddy duck	<u>0.0</u>	<u>1.9</u>	<u>3.8</u>	<u>1.7</u>	<u>4.3</u>	<u>2.4</u>	<u>0.6</u>	<u>1.5</u>	<u>5.7</u>	<u>4.4</u>
Subtotal	0.3	2.8	5.8	2.2	8.1	2.6	0.6	1.8	6.4	5.4
Miscellaneous										
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ducks	9.9	9.3	22.8	11.8	53.1	14.7	15.3	18.1	25.4	50.4

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 6. Status of waterfowl brood and late-nesting indices by stratum in North Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, and the 1958-1999 long-term mean (index in thousands).^a

Species	Strata (2000)				2000 Total	1999 Total	10-year Mean	Long-term Mean	Percent change from		
	43	45	46	47					1999	10-year Mean	Long-term Mean
Broods											
Duck brood index	21.6	93.9	100.0	2.1	217.6	189.4	99.0	55.8	15%	120%	290%
Average brood size ^b	5.5	5.3	5.2	-	5.3	6.6	5.8	5.4	-20%	-9%	-2%
Coot brood index	0.2	41.8	24.0	0.7	66.7	82.5	40.2	16.7	-19%	66%	299%
Late-nesting index ^c											
Ducks											
Dabblers											
Mallard	1.0	1.1	1.8	0.0	3.9	5.1	6.6	8.1	-24%	-41%	-52%
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Gadwall	0.2	0.7	1.7	0.0	2.6	1.5	4.7	5.5	73%	-45%	-53%
Am. wigeon	0.0	0.0	0.0	0.0	0.0	0.5	0.9	0.8	-	-	-
Green-winged teal	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.2	+	NC	-50%
Blue-winged teal	0.5	0.9	1.2	0.0	2.6	1.1	3.3	4.7	136%	-21%	-45%
N. shoveler	0.2	0.0	0.3	0.0	0.5	0.2	0.4	0.4	150%	25%	25%
N. pintail	<u>0.5</u>	<u>0.4</u>	<u>0.1</u>	<u>0.0</u>	<u>1.0</u>	<u>0.5</u>	<u>0.7</u>	<u>1.5</u>	<u>100%</u>	<u>43%</u>	<u>-33%</u>
Subtotal	2.4	3.1	5.2	0.0	10.7	8.9	16.7	21.2	20%	-36%	-50%
Divers											
Redhead	0.0	0.2	0.3	0.0	0.5	0.4	1.3	1.1	25%	-62%	-55%
Canvasback	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	NC	-	-
Scaups	0.7	0.0	0.2	0.0	0.9	0.0	0.1	0.4	+	800%	125%
Ring-necked duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Goldeneyes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Bufflehead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Ruddy duck	<u>0.2</u>	<u>1.1</u>	<u>1.2</u>	<u>0.3</u>	<u>2.8</u>	<u>2.6</u>	<u>4.0</u>	<u>3.7</u>	<u>8%</u>	<u>-30%</u>	<u>-24%</u>
Subtotal	0.9	1.3	1.7	0.3	4.2	3.0	5.6	5.5	40%	-25%	-24%
Miscellaneous											
Oldsquaw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Scoters	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Mergansers	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>NC</u>	<u>NC</u>	<u>NC</u>
Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NC	NC	NC
Total ducks	3.3	4.4	6.9	0.3	14.9	11.9	22.4	26.7	25%	-33%	-44%

^aUnadjusted for visibility bias.

^bFrom complete Class II and III broods observed.

^cAs indicated by observed adult pairs and singles.

Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 7. Long-term trend in July pond indices by stratum in North Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, the 1970-1999 long-term mean, and comparison of May with July ponds in 2000 (estimates in thousands).^a

Year	Strata				Total
	43	45	46	47	
1970	46.1	286.1	80.4	23.2	435.7
1971	104.4	230.8	77.9	9.7	422.9
1972	71.9	191.1	57.5	10.4	330.9
1973	87.3	130.7	24.5	7.3	249.7
1974	42.0	194.7	44.5	15.6	296.8
1975	73.9	213.2	155.6	25.0	467.7
1976	74.0	215.2	63.4	8.7	361.3
1977	68.7	71.2	32.4	2.8	175.0
1978	59.4	104.3	64.4	2.1	230.2
1979	79.1	156.7	66.0	15.6	317.5
1980	38.7	51.1	30.3	2.4	122.5
1981	55.2	95.9	35.0	8.7	194.7
1982	97.6	175.6	73.8	10.8	357.9
1983	50.4	281.3	140.4	21.6	493.6
1984	75.0	265.0	143.6	15.6	499.3
1985	94.9	132.1	51.4	9.7	288.1
1986	101.9	182.8	94.1	18.8	397.6
1987	88.6	149.9	93.4	5.2	337.2
1988	63.3	79.2	34.1	4.2	180.8
1989	105.1	63.3	39.3	5.6	213.3
1990	99.5	75.3	36.2	5.6	216.5
1991	99.2	60.4	53.4	5.6	218.6
1992	76.2	70.0	44.6	9.7	200.5
1993	229.8 ^b	312.0	174.4	18.4	734.6
1994	97.6	211.8	156.4	19.1	484.9
1995	146.2	343.9	260.3	27.5	777.9
1996	73.2	330.1	206.9	15.6	625.8
1997	73.5	344.2	238.9	26.1	682.7
1998	78.0	274.4	218.3	25.0	595.7
1999	137.4	811.9	338.7	27.1	1315.1

Table 7 (cont). Long-term trend in July pond indices by stratum in North Dakota, comparing 2000 with 1999, the 1990-1999 previous 10-year mean, the 1970-1999 long-term mean, and comparison of May with July ponds in 2000 (estimates in thousands).^a

Year	Strata				Total
	43	45	46	47	
2000	99.8	416.8	219.9	19.8	756.3
2001					
2002					
2003					
2004					
2005					
2006					
2007					
2008					
2009					
10-year mean	111.1	283.4	172.8	18.0	585.2
Long-term mean	86.3	203.5	104.3	13.4	407.5
<u>Percent Change</u>					
2000 from 1999	-27%	-49%	-35%	-27%	-42%
2000 from 10-year mean	-10%	47%	27%	10%	29%
2000 from long-term mean	16%	105%	111%	48%	86%
May ponds 2000 (adjusted)	105.1	363.2	242.4	23.6	734.3
<u>Percent change</u>					
May to July 2000					
(adjusted)(unadjusted)	-5%	15%	-9%	-16%	3%

^aJuly ponds unadjusted for visibility bias.

^bDue to an abnormally high visibility rate in May, 1993 July ponds for stratum 43 were calculated by applying % change from May to July raw data, to adjusted May ponds. Resulting from rounding techniques, slight discrepancies may exist in column totals.

Table 8. Survey design for North Dakota, July 2000.

	Stratum				
	43	45	46	47	Total
<u>Survey design</u>					
Square miles in stratum	19,835	26,625	14,238	7,821	68,519
Square miles in sample - water	175.5	310.5	270	45	801
Square miles in sample - ducks	87.75	155.25	135.0	22.5	400.5
Linear miles in sample	702	1,242	1,080	180	3,204
Number of transects in sample	5	7	8	6	26
Number of segments in sample	39	69	60	10	178
Expansion factor - water	113.0200	85.7488	52.7334	173.8000	-
Expansion factor - ducks	226.0399	171.4976	105.4667	347.6000	-
<u>Current year coverage</u>					
Square miles in sample - water	175.5	288.0	270	45	778.5
Square miles in sample - ducks	87.75	144.0	135.0	22.5	389.25
Linear miles in sample	702	1,152	1,080	180	3,114
Number of transects in sample	5	7	8	6	26
Number of segments in sample	39	64	60	10	173
Expansion factor - water	113.0200	92.4479	52.7334	173.8000	-
Expansion factor - ducks	226.0399	184.8958	105.4667	347.6000	-